

Two-dimensional gas micro-well detector fabricated using advanced processing technology (3-DTI, MWD)

Completed Technology Project (2014 - 2018)



Project Introduction

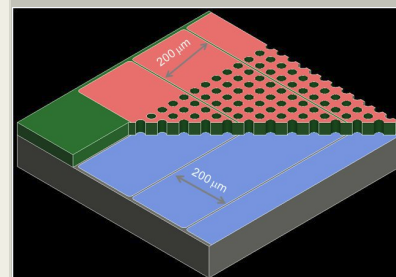
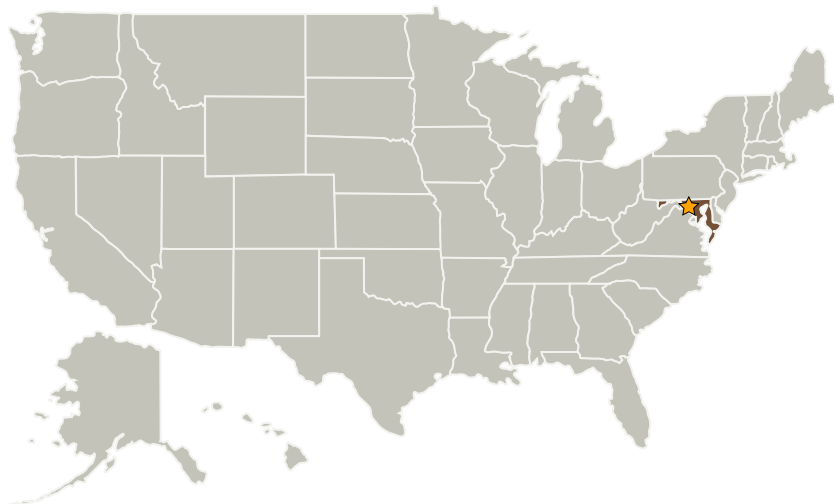
The Three-Dimensional Track Imager (3-DTI), developed at NASA Goddard Space Flight Center, is the enabling technology for future astrophysics missions. Using advanced technology, we propose to develop a process to fabricate a two-dimensional micro-well detector (MWD) readout for the 3-DTI. The MWD will provide tremendous improvements in 3-DTI reliability and performance.

The gas filled 3-DTI Time Projection Chamber (TPC) achieves high particle track resolution using a negative ion (NI) drift technique to reduce diffusion of the ionization electrons along the track of a charged particle. This technique allows the track information to be preserved over long drift distances. The negative ion (NI) technique, however, presents a challenge to the TPC readout which typically utilizes a Townsend avalanche to amplify and detect the ionization charge. Using the NI technique, the ionization electron must be knocked free from the electronegative molecule before the Townsend avalanche can occur. This work utilizes advanced material processing techniques to fabricate small, high gain MWD structures. In addition, the small features reduces any loss of active area due to MWD tiling can be reduced to nearly zero and outgassing concern eliminated by using inorganic insulator and support materials.

Anticipated Benefits

This project will benefit several future space missions to study x-rays and gamma-rays.

Primary U.S. Work Locations and Key Partners



Two-dimensional gas micro-well detector fabricated using advanced Si wafer technology Project (MWD)

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Links	2
Organizational Responsibility	2
Project Management	2
Project Website:	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Two-dimensional gas micro-well detector fabricated using advanced processing technology (3-DTI, MWD)

Completed Technology Project (2014 - 2018)

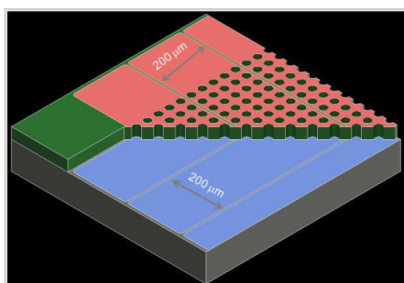


Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Images


Two-dimensional gas micro-well detector fabricated using advanced Si wafer technology Project (MWD)

Two-dimensional gas micro-well detector fabricated using advanced Si wafer technology Project (MWD) (<https://techport.nasa.gov/image/16847>)

Links

Imaging micro-well proportional counters fabricated with Masked UV laser ablation
(http://ac.els-cdn.com/S0168900201019088/1-s2.0-S0168900201019088-main.pdf?_tid=f18a9e22-553c-11e4-92b1-00000aabb0f02&acdnat=1413468276_df727aec4246bc4b5609a41340fc2adc)

NTR 1437669748
(no url provided)

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:Megan E Eckart
Timothy D Beach**Principal Investigator:**

Stanley D Hunter

Co-Investigators:Andrei R Hanu
Mary J Li

Two-dimensional gas micro-well detector fabricated using advanced processing technology (3-DTI, MWD)

Completed Technology Project (2014 - 2018)

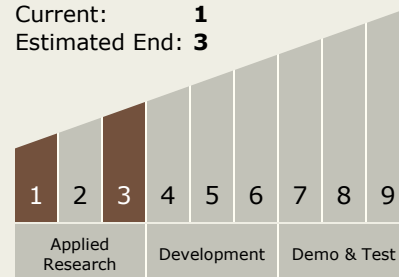


Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

Others Inside the Solar System,
Outside the Solar System,
Foundational Knowledge